**Project Title:**
Storm-time ring current: Development of a new storm index and its prediction from solar wind and IMF parameters

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**Project Information:**
Space weather is an essential component of the "Living with a Star (LWS)" Program, and the magnetospheric storm is the main target of space weather because of its hazardous nature. The physics and prediction of magnetospheric storms have been conventionally addressed in terms of the Dst index, which is ideally regarded as a measure of the ring current intensity. However, there is a growing conjecture that a considerable fraction (~25%) of storm-time Dst can be actually attributed to the tail current. Furthermore, the substorm-associated variations of the tail current and the ring current have opposite effects on Dst, and the former overcompensates the latter. Thus the conventional Dst index is misleading with regard to not only the intensity of the ring current but also the timings of the ring current development and decay. The present project seeks to develop (1) a new index for the intensity of the ring current and (2) a basic scheme to predict this new index from solar wind and IMF measurements. For (1), first Dst (Sym-H will be actually used) will be decomposed into the trend and auto regression (AR) components; the AR component represents substorm-association variations. Then the project will derive an empirical formula to convert the AR component to the actual change of the ring current intensity by examining the associated change of global energetic neutral atom (ENA) fluxes measured by the IMAGE/HENA instrument. The new ring current index can be obtained by adding this converted AR component back to the trend component. The developed procedure calculates the ring current index based solely on Dst. The procedure will be applied to storm events in the last 18 years. Then the project seeks to examine the predictability of this new ring current index from solar wind and IMF measurements. The prediction scheme developed should be more adequate for predicting the intensification and decay of the ring current during magnetospheric storms. The project will also examine the asymmetry of the ring current by comparing the AR component with the Asy-H index. The successful achievement of this project will provide an important component for space weather and therefore for the LWS program.

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**Citations:**

**Summary:** "

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